

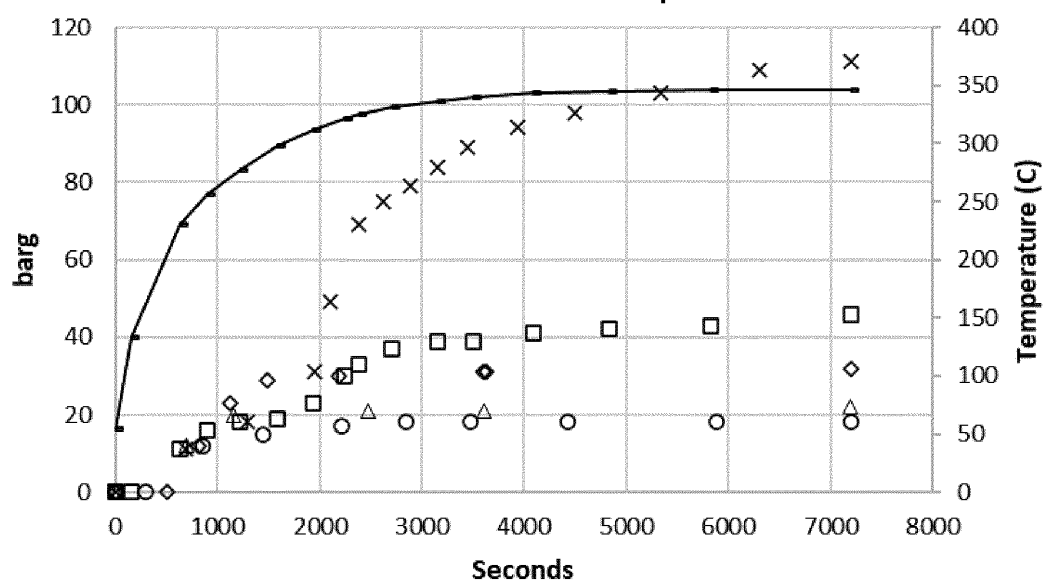
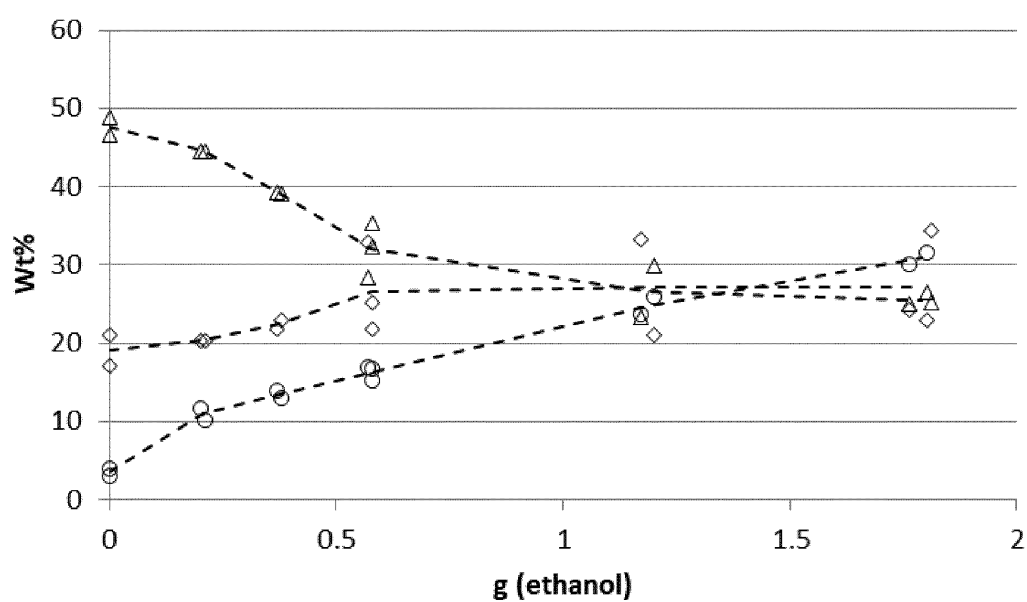
Figure 1**Effect of various reaction conditions on reaction pressure at 350C****Figure 2****Effect of amount of ethanol added on product yields**

Figure 3
Effect of ethanol density on liquefaction performance

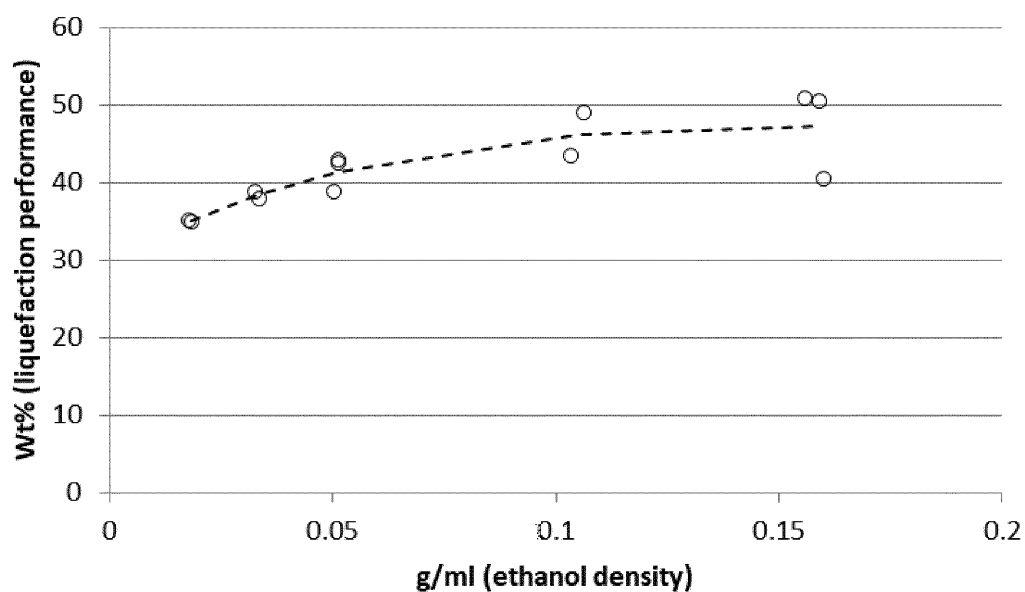


Figure 4
Effect of amount of ethanol added on product yields

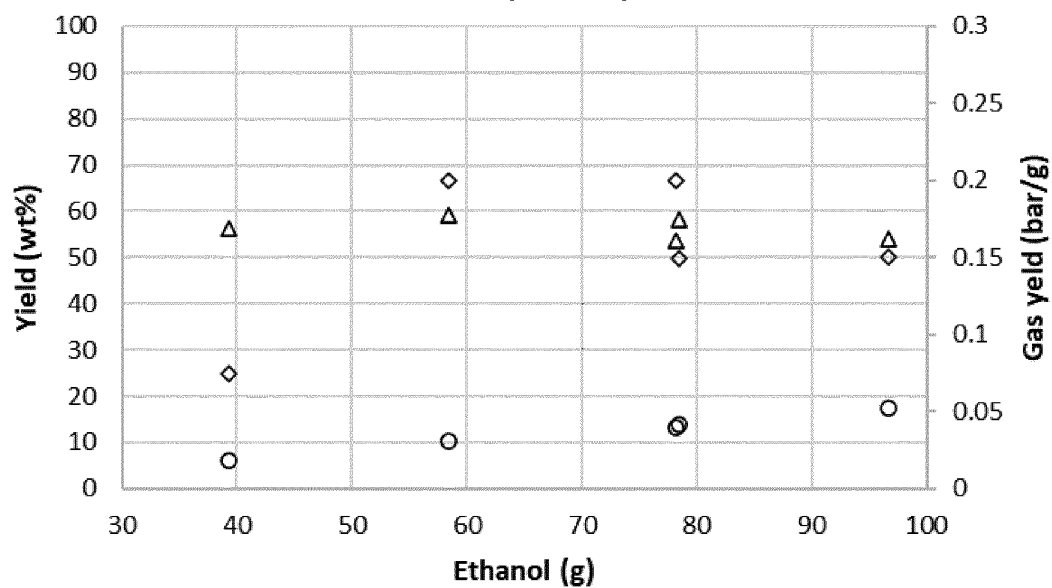


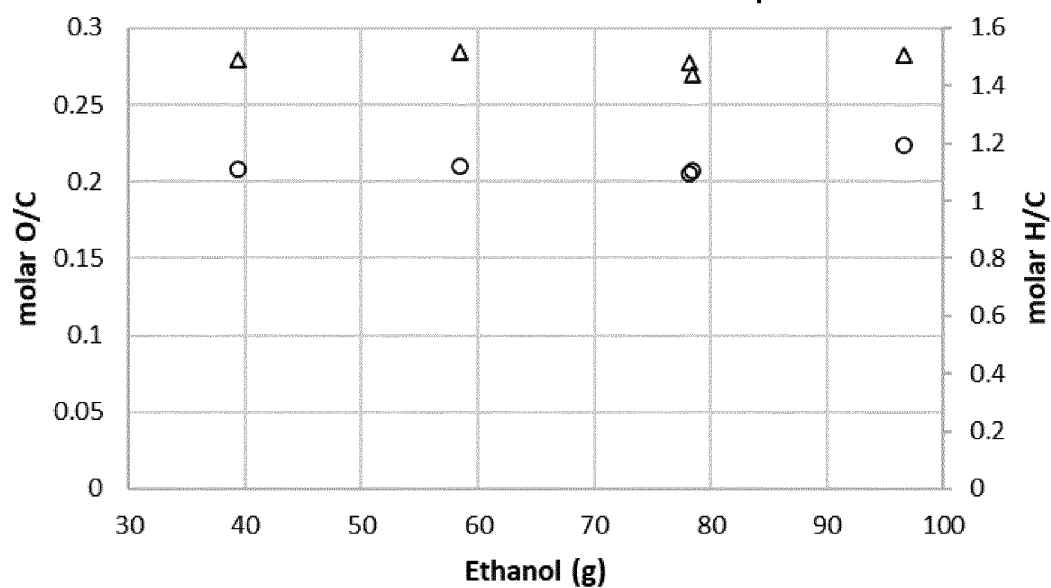
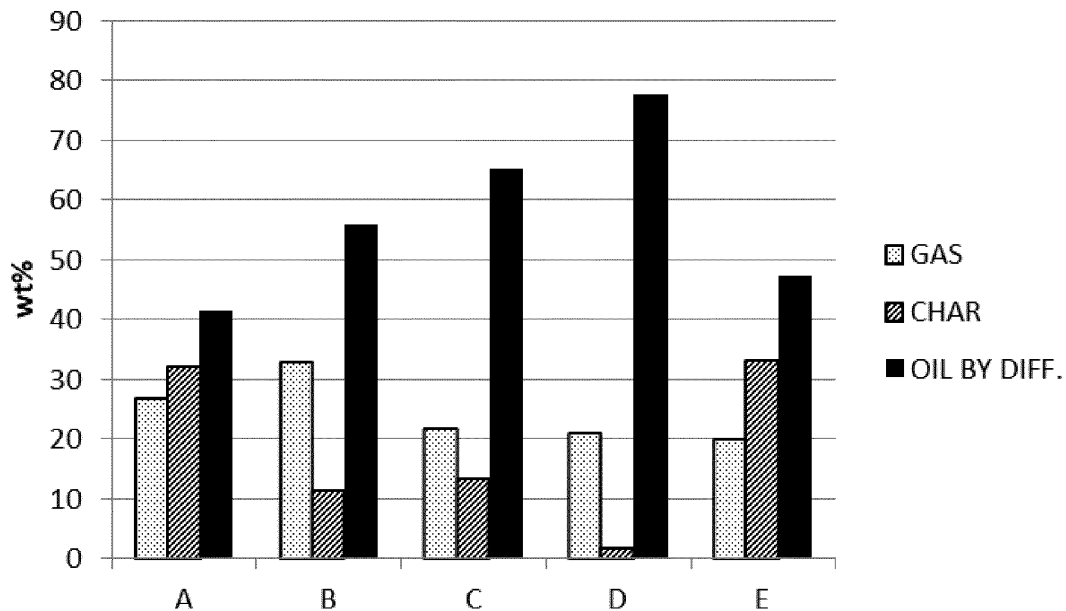
Figure 5**Effect of amount of ethanol added on the elemental composition of oil****Figure 6****Effect of different model compounds added as “recycle oil” in the presence of ethanol**

Figure 7
Effect of various combinations with Anisole

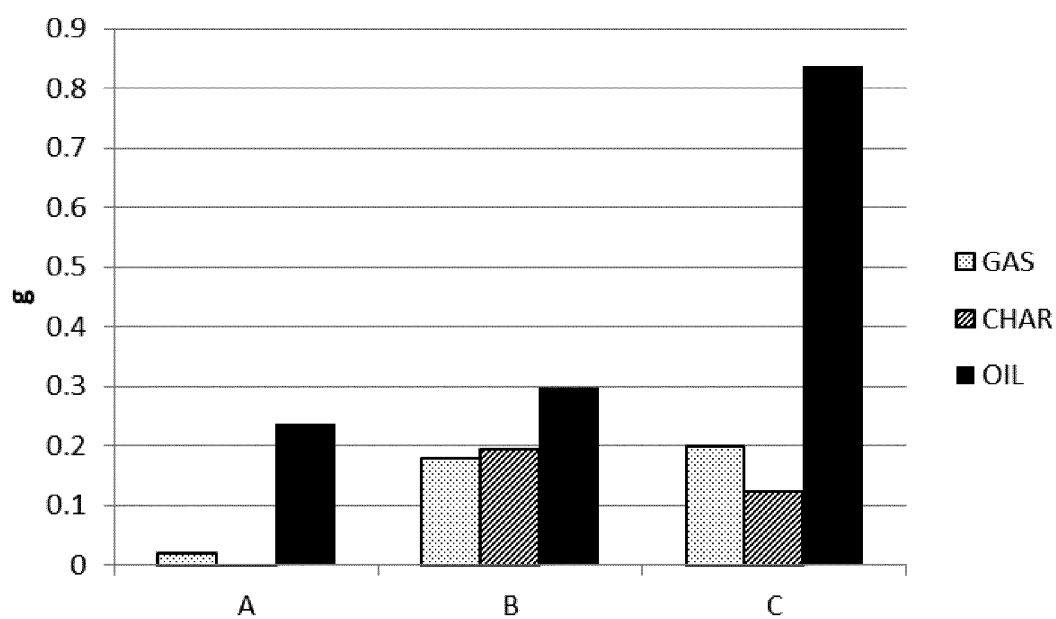


Figure 8
Effect of various combinations with Tar

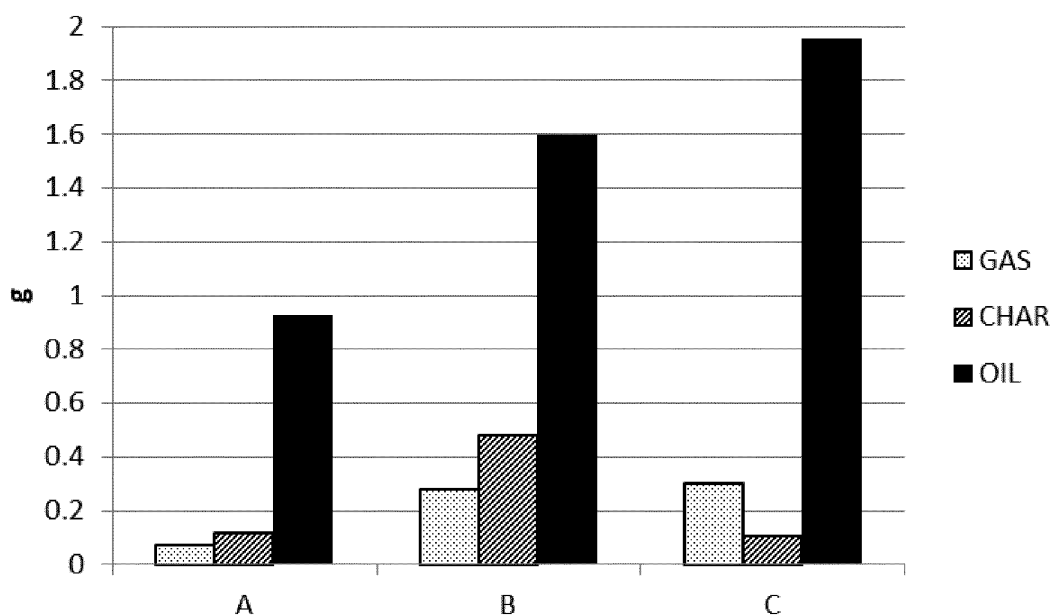


Figure 9
Effect of various combinations with real recycled oil

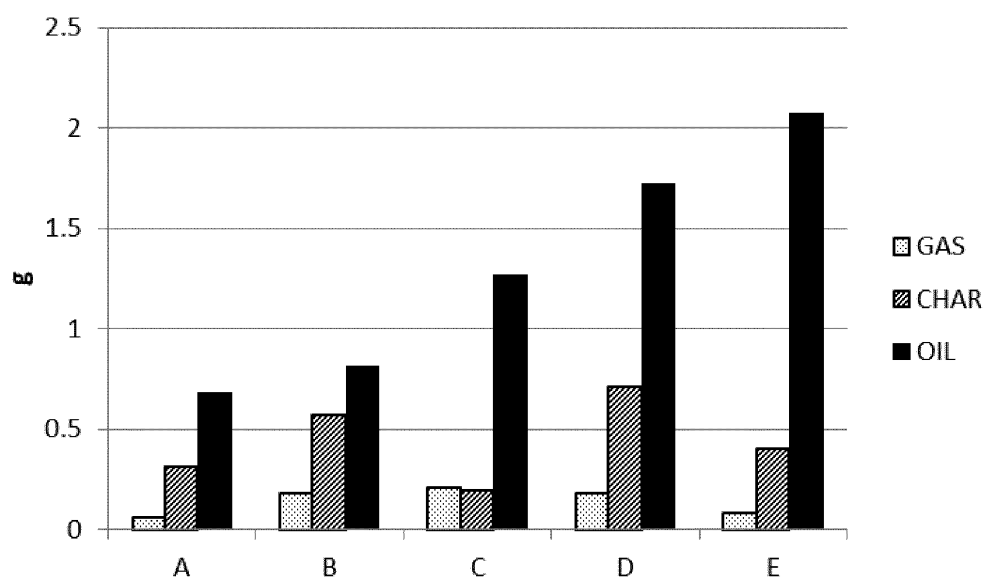


Figure 10
Effect of amount of biomass added on product yields

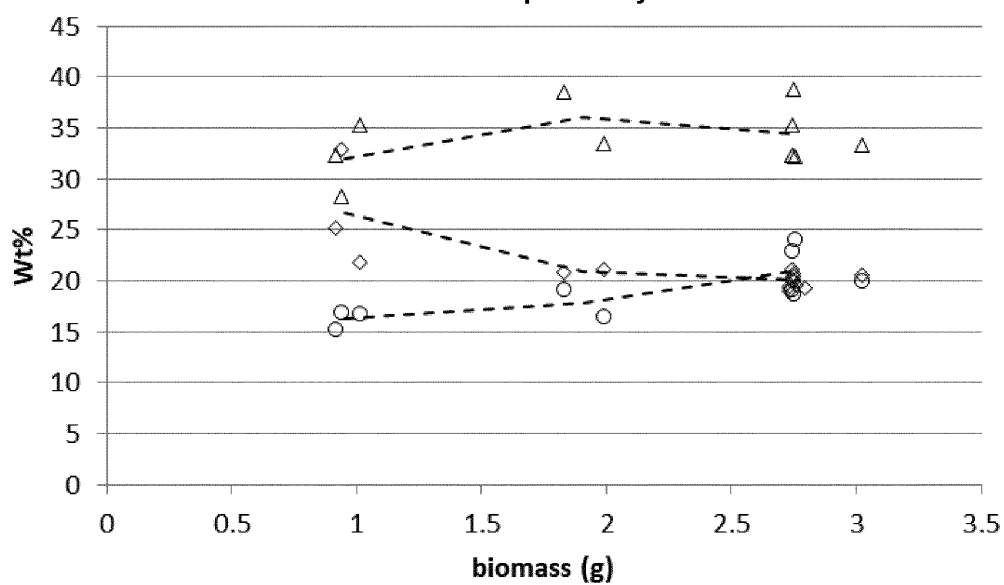


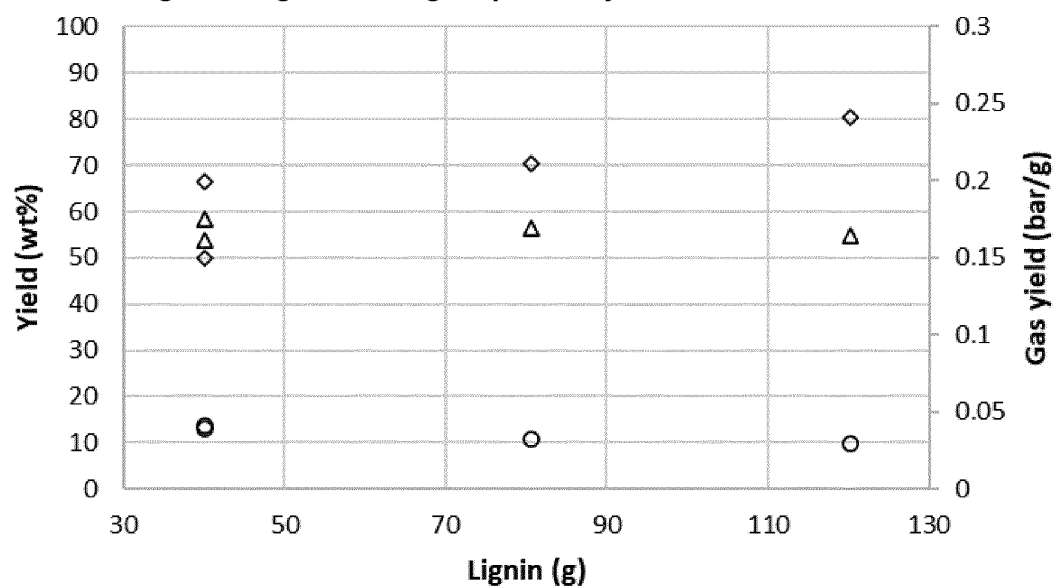
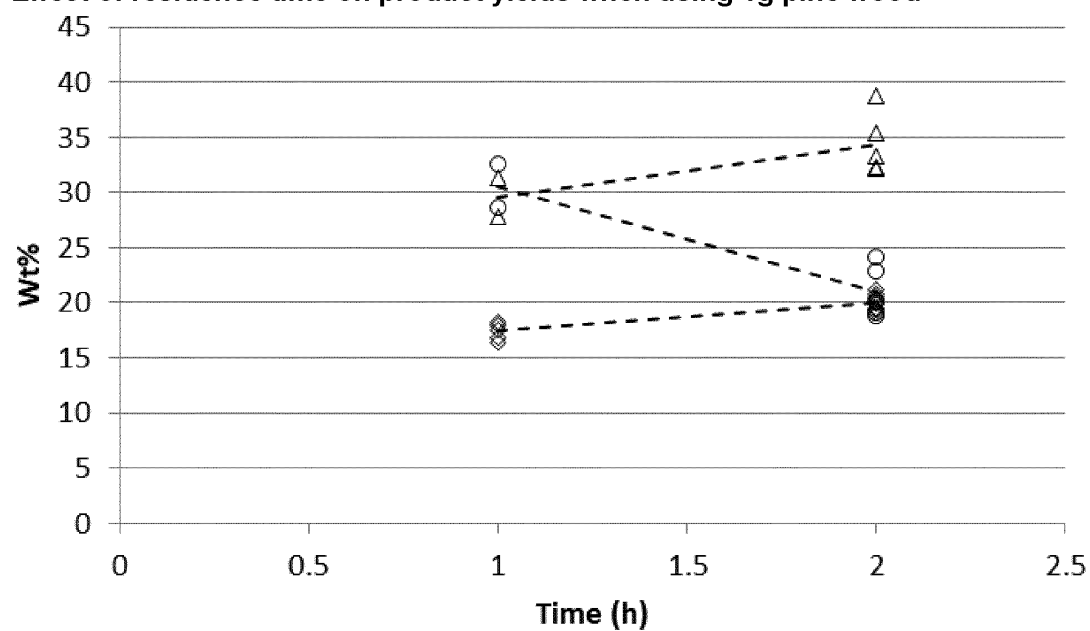
Figure 11**Effect of degree of lignin loading on product yields****Figure 12****Effect of residence time on product yields when using 1g pine wood**

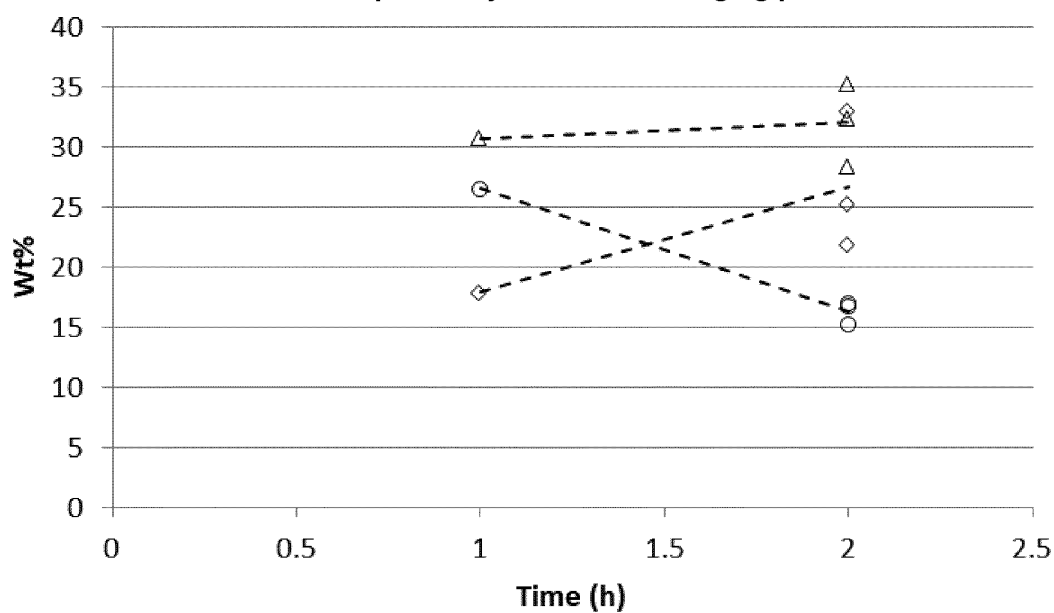
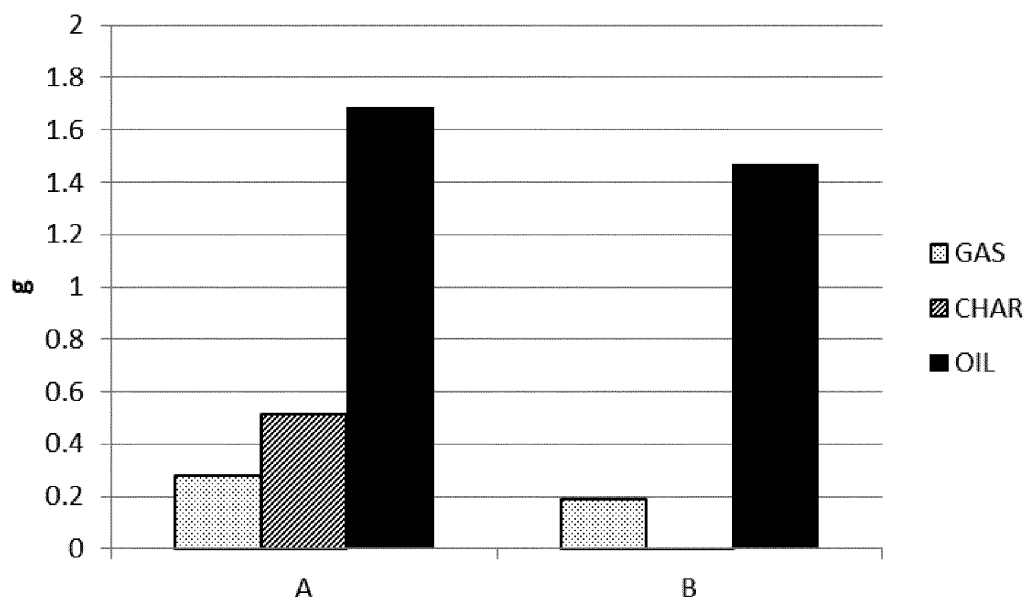
Figure 13**Effect of residence time on product yields when using 3g pine wood****Figure 14****Effect of reaction time, 2h (A) vs. 1h (B), for two experiments with recycled oil, ethanol and biomass.**

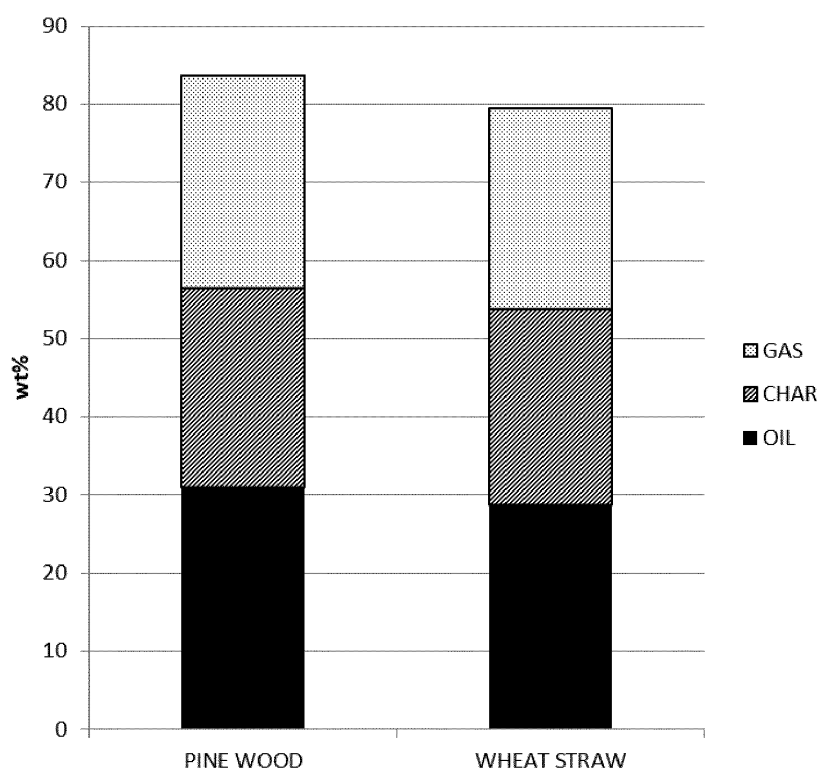
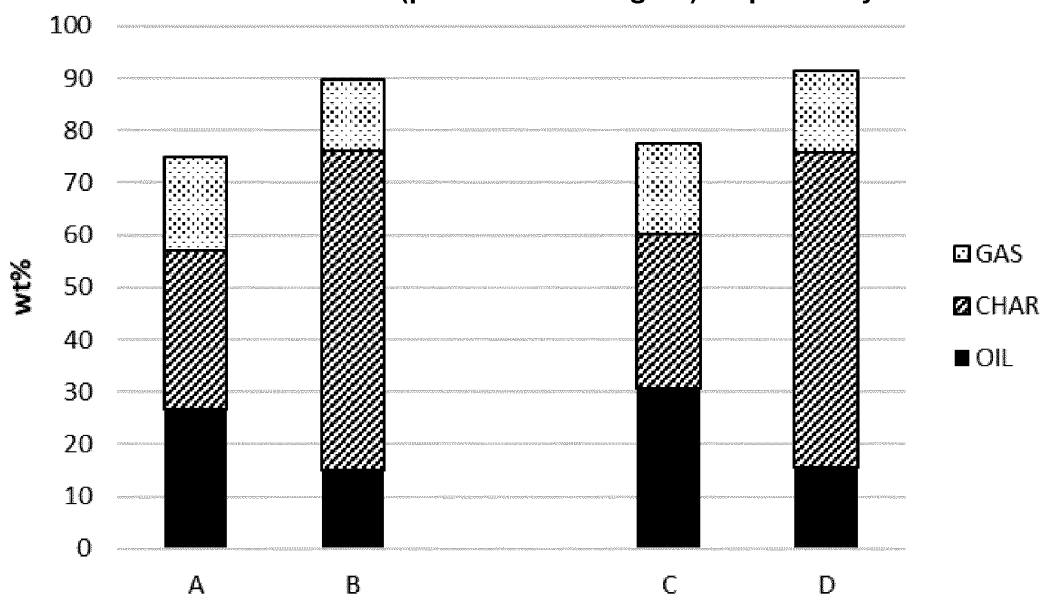
Figure 15**Effect different feedstocks (pine wood and wheat straw) on product yields****Figure 16****Effect of different feedstocks (pine wood and lignin) on product yields**

Figure 17

Effect of feedstock biomass (lignin vs. pine vs. birch) on elemental composition of oil

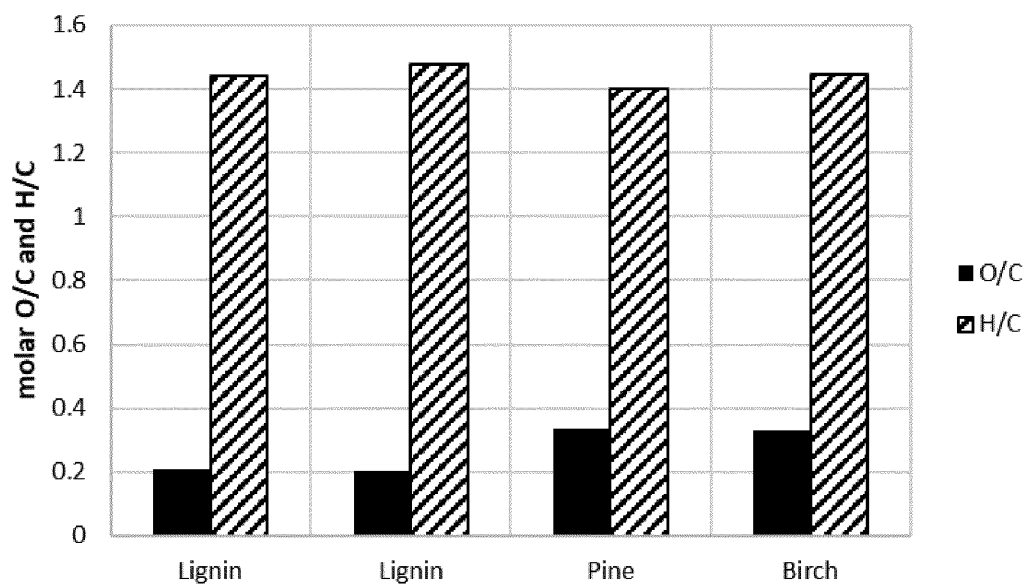


Figure 18

Effect of feedstock biomass (lignin vs. pine vs. birch) on product yields

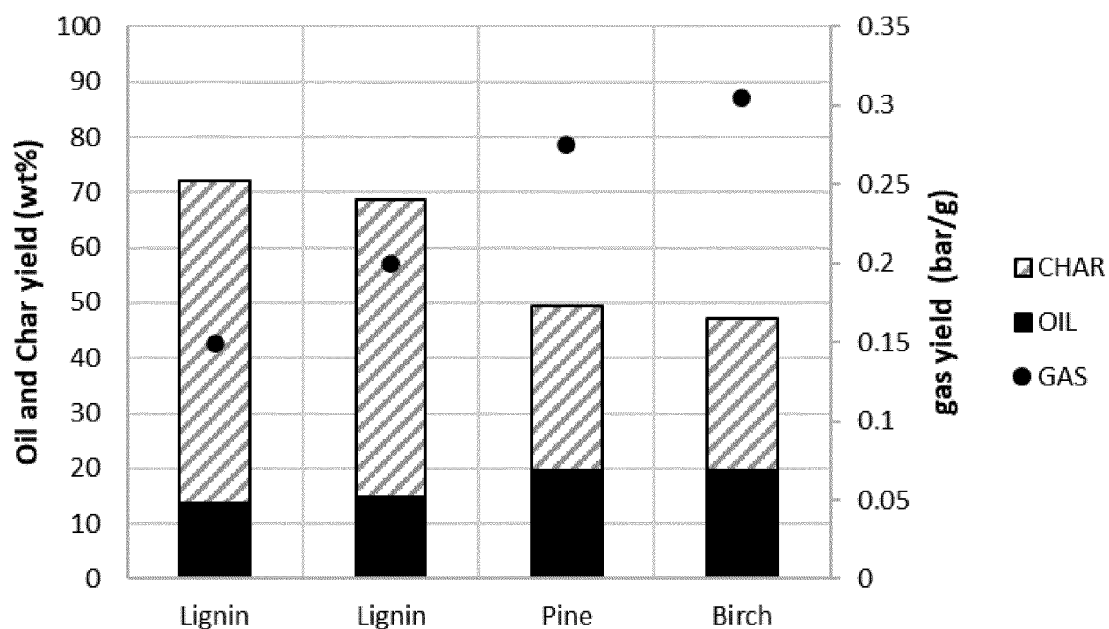


Figure 19
Effect of lignin-oil HDO on upgraded product oil composition

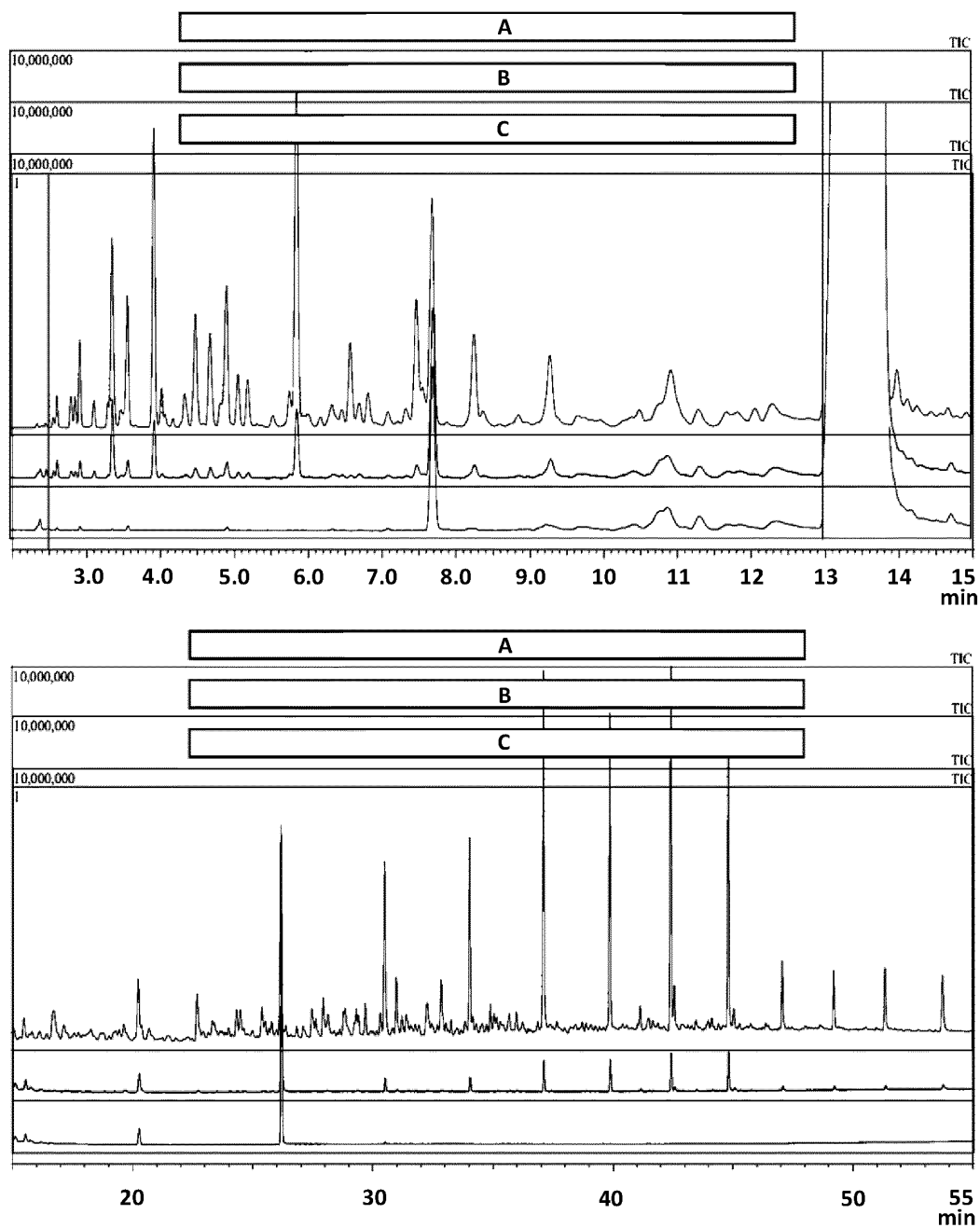


Figure 20
Effect of HDO on Decane solvent composition

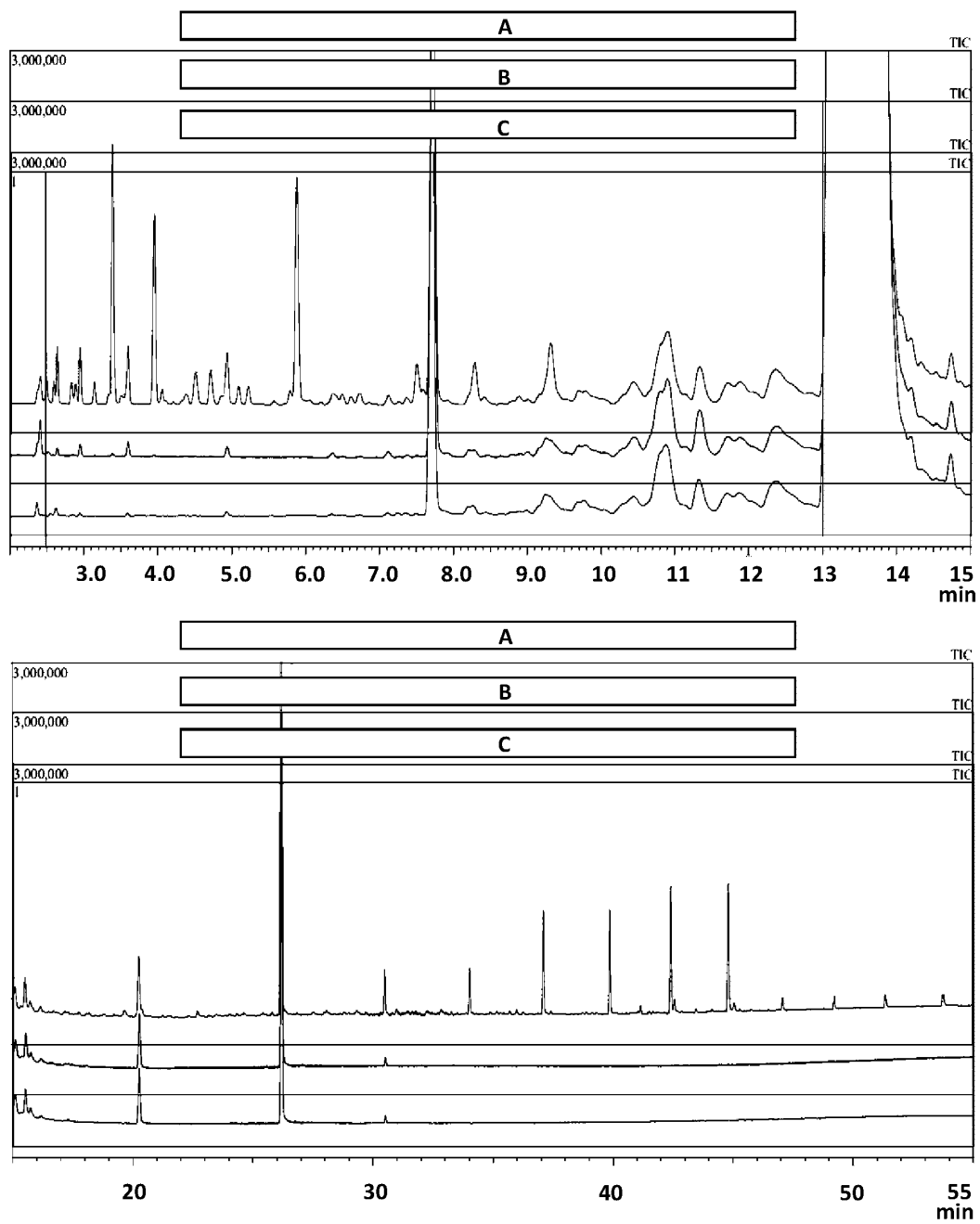


Figure 21

Effect of wood-oil HDO at different reaction temperatures on upgraded product oil composition

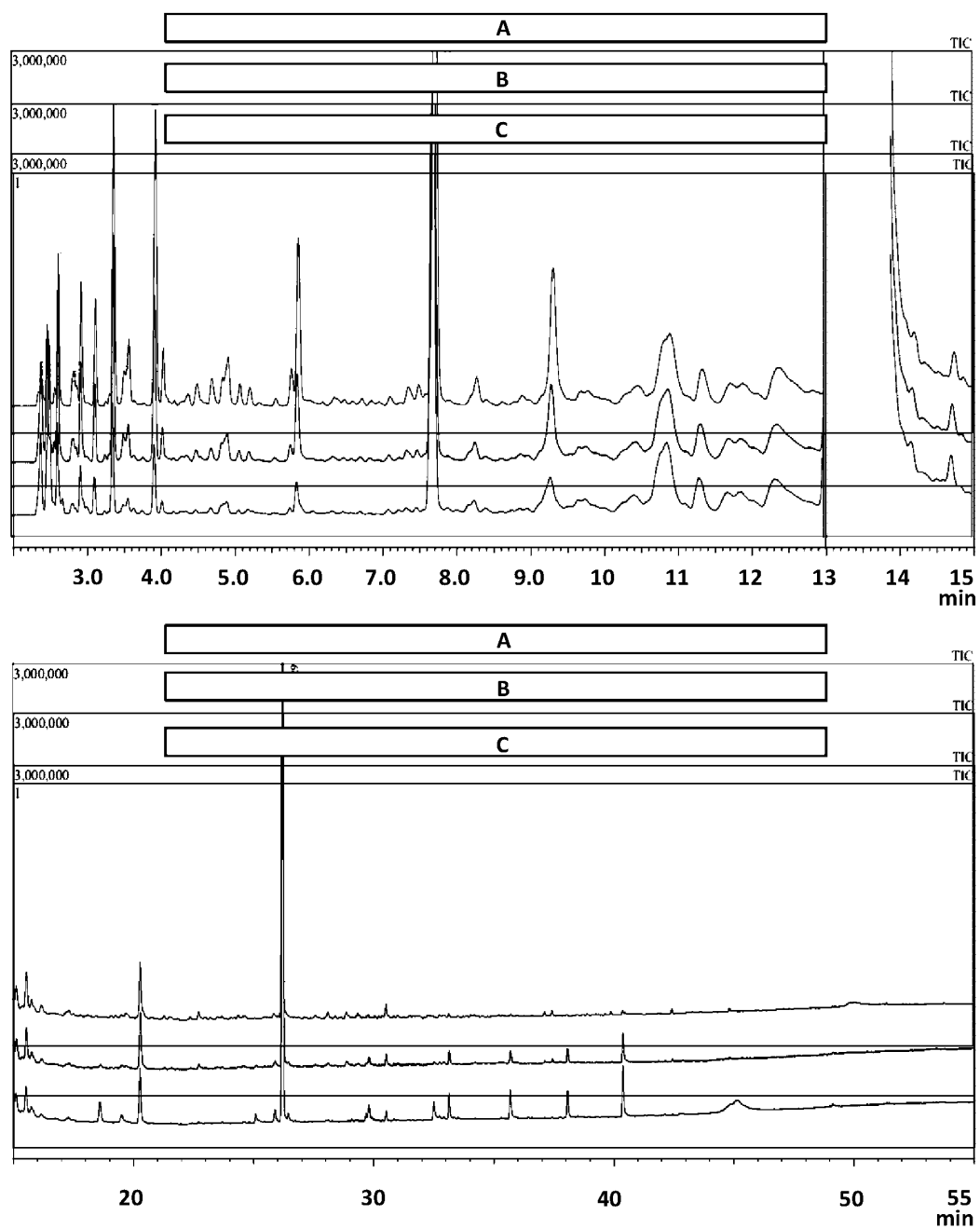


Figure 22

Comparison of product oil composition after HDO of lignin-oil and wood-oil at similar conditions

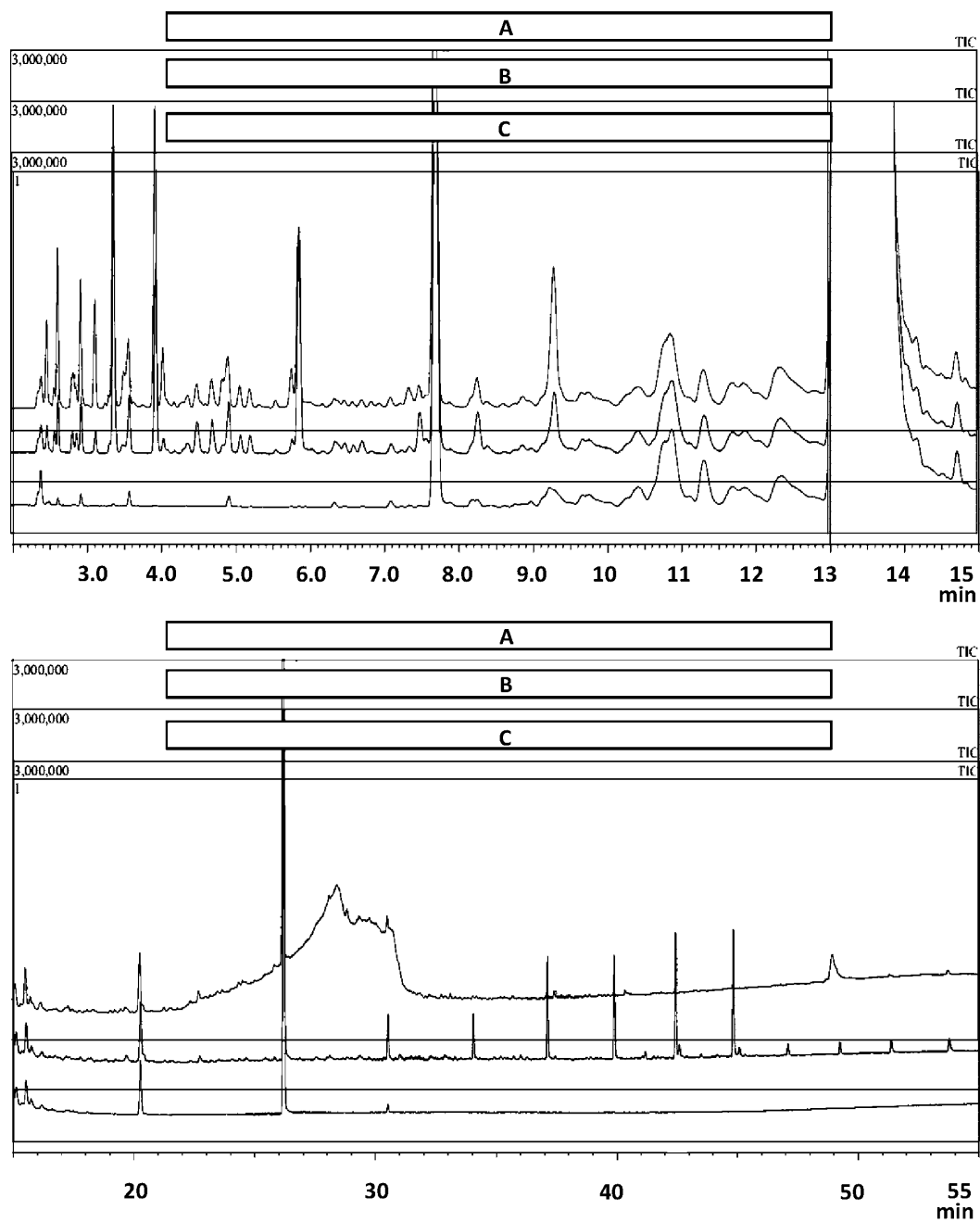


Figure 23

One embodiment of a system suitable for practicing methods of the invention

